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AUTHOR Alston, Herbert L.
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ABSTRACT

This publication discusses the development and use of an Educational Needs Projection (ENP) model designed to estimate the number of students "who have difficulty with instruction in English" in the Houston Independent School District. Unlike a state-mandated program that requires teachers and counselors to identify Limited English-Speaking Ability (LESA) students, the ENP model estimates the number of LESA students from questionnaires completed by a stratified random sample of students' parents. The author describes the sampling procedure, rate of questionnaire return, confidence limits, and planning use of the ENP model and presents a number of statistical tables containing data from a survey that used the ENP model to estimate the number of LESA students in grades 1-3. Also included are tables that present data on LESA students based on teachers' and counselors' evaluations. (JG)

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TITLE IV-C PILOT PROGRAM: AN EDUCATIONAL NEEDS PROJECTION MODEL

Project Report

Estimates of the Numbers of Limited-English-Speaking-Ability (LESA) Students in HISD (K-3)

Prepared By

Herbert L. Alston

JULY 15, 1977

EA 009 873

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ESTIMATES OF THE NUMBER OF LIMITED-ENGLISH SPEAKING-ABILITY (LESA) STUDENTS IN HISD (K-3)

Introduction

The general purpose of this project (Title IV-C Pilot Program: An Educational Needs Projection Model) is to develop procedures for forecasting the personnel needed by the school district for a five-year period in response to current and expected legislation, changing student population, etc. During the first project year, 1976-77, emphasis is placed on forecasting the personnel needed for mandated bilingual education programs.

This report summarizes the procedures used to estimate the number of Limited-English-Speaking-Ability (LESA) students in grades K through 3 in the Houston Independent School District.

Survey of LESA Students for TEA

Texas Senate Bill 121 requires the school districts to conduct a survey to determine the number of LESA students in the school district by grade level and by their home language. This survey is conducted in HISD by asking teachers and counselors "to identify students not working at grade level because of their inability to understand English adequately." The results of this survey for all students are presented in Table 1 and the results for Spanish-speaking students are presented in Table 2.

Tables will be on separate pages in the back of the report.

Educational Needs Projection Model

The development of an Educational Needs Projection (ENP) Model involves developing procedures for estimating the number of students in the category to receive a particular educational program (see appendix for description of the ENP Model). In some cases the number of students who qualify for a particular educational program may be determined from student records. In many cases, however, it is desirable to determine a sampling procedure which allows a good estimate of the number of students in a category based on a relatively small sample of students.

Sampling Procedures

Cochran (1963) and others (e.g., Kish, 1965) discuss alternative sample designs that may be used to estimate the proportion and/or number of individuals in a population who have a certain characteristic. Consideration of sample designs is technical. In brief, if individuals may be grouped into strata on some known characteristic so that the proportion of individuals with the characteristic one wants to estimate differs greatly, a stratified random sample will provide the best estimate of the characteristic of interest with the smallest possible sample size.

The sample design chosen was a stratified random sample with optimal allocation (see Cochran, 1963). Individuals were grouped into strata on the basis of ethnic group membership, because the proportion of LESA students in the ethnic groups was known to differ greatly. That is, a very small proportion of Anglo-American or Negro-American students are LESA students, where as a relatively large proportion of the Mexican-American and Other-American groups were expected to be LESA students.

The formula for calculating the total sample size (n) with this design is Formula 5.51 on Page 109 of Cochran 1963 (where the variance of the estimated characteristic V is d^2/t^2; d is the half-width of the confidence interval divided by the size of the population; and t is the normal deviate or z score for the desired alpha level) (see Section 4.4 of Cochran, 1963). Given the total sample size (n), the sample size of each strata (nh) is calculated by Formula 5.48 on Page 107 of Cochran.

In calculating the required sample size one should choose the probability closest to .5 of individuals in each strata that might have the desired characteristic. These proportions were set at .01, .01, .5 and .4 for the Anglo-American, Negro-American, Mexican-American and Other-Americans, respectively. The confidence interval was set at plus or minus 200 students (or at approximately 1% of the total number of students at each grade level in HISD) and the alpha level at .9. This is to say that with a stratified random sample of size n we would be able to estimate the number of LESA students at a grade level within plus or minus 200 students with a probability of .9. Decreasing the size of the confidence interval or increasing the alpha level results in much larger sample size requirements.

The sample size formulas are presented in Figure 1 and the required sample sizes are presented in Table 3.

A random sample of student names from each ethnic group in grades K through 3 were chosen from student enrollment tapes. An attempt was then made to contact the parents of these students by telephone to adminster a questionnaire (Language Resource Questionnaire for Parents of HISD Parents) developed in English and Spanish for this LESA study. Parents who could not be contacted by telephone were sent a copy of the questionnaire and a letter explaining the study.

Rate of Return

The initial estimate of the sample size needed (see Table 3) was 3202. A somewhat larger sample (N=4303) was selected from computer tapes of student enrollment because it was expected that a number of students would not be available for the study for various reasons (e.g., student mobility in each area of HISD varies from 25 to 40 percent per year).

Parents of the students selected in the sample were contacted by telephone and interviewed with the Language Resource Questionnaire for Parents of HISD Students by bilingual interviews. As many as three attempts were made to contact a parent by telephone. If a student's parents could not be contacted by telephone, a questionnaire and cover letter was sent to them through the schools.

A record was kept of the attempts to contact parents by telephone and the number of parents who refused to be interviewed. The interviewers, however, were apparently not consistent in recording the information on rejected interviews. It is estimated that over 90% of the parents contacted by telephone were interviewed.

It is estimated that 30% of the sample was contacted by telephone. Sixty-two percent could not be contacted by telephone because the telephone number was missing or wrong, or because the phone number had been changed or the family had moved. Parents who could not be contacted by telephone were sent the questionnaire and a cover letter explaining the survey through the schools in which their children were enrolled. An incomplete tabulation of the rate of return on the questionnaires sent through the schools indicated that above 22% of the students in the survey were no longer enrolled in the schools listed on the student enrollment tapes. Of the questionnaires sent home to parents by the selected students from 36% to 42% were returned. Due to time constraints, the analyses were done on the 1898 protocols (see Table 17) returned by June 1, 1977.

In brief, over 90% of the parents contacted by telephone responded to the questionnaire. Only 38% of the original sample, however, could be contacted by telephone. Of those sent a questionnaire through their students at school, about 22% of the students were no longer enrolled in the schools. Of the questionnaires sent home to parents by their schoolchildren from 36% to 42% were returned.

Number of LESA Students in K-3

Estimates of the number of LESA students depend on how one defines the LESA category (Waggoner, 1976). Typical definitions of LESA individuals are based on (a) whether the individual was born outside the United States, (b) whether the individual usually speaks a language other than English, (c) whether the individual comes from a home in which the language usually used is other than English, or (d) whether the student encounters difficulty in classroom instruction because of a limited ability to understand or use the English language. The results of the LESA study are presented in Tables 4 through 11.

As can be seen in Tables 4 through 7, from 2.9% of the first grade students to 5.4% of the third grade students were born outside of the United States. Of those born outside of the United States, from 70 to 90% were Mexican-Americans. From 8.9% of the first grade students to 11.7% of the kindergarten students came from a home in which a language other than English is usually spoken. Of those who come from a home in which English is not the dominant language, from 90 to 100% were Mexican-Americans. From 1.3% of the third grade students to 5.4% of the kindergarten students were rated as having difficulty in understanding instruction in English. Of these students, from 76% to 100% were Mexican-Americans. The percentage of students in K through 3 (see Table 16) who meet any one of the above three criteria were 13.5%, 10.2%, 11.4% and 11.2% , respectively. Based on the enrollment figures for October, 1976, the estimated numbers of LESA students in K through 3 are 2,091; 1,950; 1,941; and 1,785, respectively. The results of this survey provide more information than the survey conducted earlier in the year for the Texas Education Agency. Depending on the LESA criteria used, the number of LESA students estimated is either smaller or of about the same magnitude as the number of students identified in the survey conducted for TEA.[1]

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[1] The survey for TEA is based on the opinions of school personnel and the present survey is based on parental responses to a questionnaire.

Confidence Limits for Estimated Proportions and Estimated Numbers of LESA Students

Whenever a sample is taken for the purpose of estimating a population value, one expects that the population value would be close to the estimated value but not necessarily the same as the sample value. The sample statistic is the best estimate of the population parameter, but one can also calculate the range of values in which the population value will have a specified probability of falling. In the present case we wish to calculate the range of values, or confidence limits, for the estimated proportion of LESA students and the estimated number of LESA students at each grade level.

The variance of the estimated proportion is given by Formula 5.43 on Page 106 of Cochran (1963) and the formula for the confidence limits of a proportion is 3.17 on Page 57 of Cochran. The number of LESA students per grade level is calculated by multiplying the number of students in the grade level times the calculated proportion of LESA students (i.e., number of LESA students = Np). The confidence interval for the estimated number of LESA students per grade level is calculated using a modification of Formula 5.14 on Page 94 of Cochran. (Since the mean of a dichotomously scored distribution is equal to p, the proportion of individuals with the desired characteristic, p may be substituted for $\bar{y}$ st). Formulas 5.43, 3.17, and 5.14 from Cochran are presented in Figure 2. The confidence limits of the estimated proportions and the confidence limits of the estimated number of LESA students are given in Tables 12 through 15.

Use for Education Planning

Information on the proportion of students in each grade level or the number of students in each grade level who are Limited-English-Speaking-Ability (LESA) students may be used to estimate the number of bilingual teachers and teacher aides that will be needed. And the use of confidence intervals for these intervals for these statistics may be used to determine the probable range within which these estimates of LESA students will fall.

For example, the estimated number of LESA students (defined as students having difficulty in understanding instruction in English) in kindergarten was 825 (see Table 14). Assuming a student/teacher ratio for 28/1 students, this would mean that 30 teachers would be needed for bilingual education classes in kindergarten. And assuming a teacher/teacher aide ratio of one-half, this would mean that 15 teacher aides would be needed for bilingual education classes in kindergarten.

The estimated number of LESA students (defined as students having difficulty in understanding instruction in English) has confidence limits of 519 and 1,130. Therefore, the number of bilingual teachers that may be needed for kindergarten is most likely to be about 30 but will fall within the range of 19 to 41 with a 90% probability. Similarly, the number of teacher aides needed should be about 15 and has a 90% probability of falling within 10 to 20.

This example defined LESA students as "students who have difficulty with instruction in English." Other definitions of LESA students would result in very different numbers (see Tables 12 to 16). Given information on which definition of LESA students best predicts which students are enrolled in bilingual education programs, more accurate estimates of the number of teachers needed for the programs may be made.

REFERENCES

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Kish, L. Survey Sampling. New York: Wiley, 1965.

Waggoner, D. Results of the survey of languages supplement to the July 1975 current population survey. Paper presented at the Fifth International Bilingual Bicultural Education Conference in San Antonio, Texas, May 4, 1976.

Figure 1

SAMPLE SIZE FORMULAS FROM COCHRAN

$$no = \frac{(\sum Wh \sqrt{phqh})^2}{V} \quad : \quad n = \frac{no}{1 + {}^{1}/_{NV} \sum Wh\ phqh}$$

Where no is the first approximation of n;

- n is the required sample size;
- Wh = Nh/N: is the proportion of units in each of the h strata;
- ph is the assumed proportion of sampling units within a strata with the characteristics;
- qh = (1 - ph);
- N is the size of the population; and
- V = d^2/t^2 : is the desired variance of the sample statistic p.

$$nh = n \frac{Nh \sqrt{PhQh}}{\sum Nh \sqrt{PhQh}}$$

Where nh is the sample size in each strata;

- Nh is the number in the strata in the population;
- Ph is the expected proportion of units with the characteristic in the population; and
- Qh = (1 - Ph).

Table 1

SURVEY OF LESA STUDENTS FOR TEA
ALL LANGUAGES

LANGUAGE	GRADES														SPEC.
	PRE-K	K	1	2	3	4	5	6	7	8	9	10	11	12	ED.
Area I	116	434	511	411	377	228	274	229	175	124	132	200	214	139	19
Area II	99	230	305	227	176	156	169	173	49	38	33	19	35	27	7
Area iII		96	107	103	78	63	64	71	170	212	189	129	59	33	7
Area IV		74	126	112	74	46	81	98	3	2	6	70	57	42	7
Area V	44	809	828	757	538	450	480	429	149	105	64	115	77	47	36
Area VI	37	366	419	361	300	164	141	144	815	776	711	239	180	75	46
Total	296	2,009	2,296	1,971	1,543	1,107	1,209	1,144	1,361	1,257	1,135	772	622	363	120

Table 2

SURVEY OF LESA STUDENTS FOR TEA
SPANISH LANGUAGE ONLY

LANGUAGE	GRADES														SPEC.
	PRE-K	K	1	3	3	4	5	6	7	8	9	10	11	12	ED.
Area I	111	417	485	383	357	203	263	214	164	102	107	192	207	129	19
Area II	97	203	273	196	160	140	154	159	27	26	18	8	10	9	7
Area III		86	96	85	62	55	50	58	151	196	170	109	38	19	6
Area IV		61	106	100	62	44	69	90	3	1	2	66	57	42	6
Area V	44	801	818	752	533	444	473	417	142	104	63	114	75	35	35
Area VI	37	363	413	357	295	164	138	141	810	769	706	234	179	72	44
Total	289	1,923	2,191	1,879	1,470	1,050	1,147	1,079	1,303	1,188	1,066	723	564	305	117

Figure 2

CONFIDENCE INTERVAL FORMULAS FROM COCHRAN

$$V(Pst) = \frac{1}{N^2} \sum \frac{Nh^2 (Nh - nh)}{Nh - 1} \frac{PhQh}{nh}$$

Where V(Pst) is the variance of the estimate of the proportion;
N is the number of units in the population;
Nh is the number of units in a strata;
Ph is replaced by ph, the sample proportion;
Qh is replaced by qh, and qh = (1 - ph); and
nh is replaced by (nh - 1) and nh is the number of units sampled from each strata.

$$p \pm \left[t \sqrt{1 - f} \sqrt{pq/(n - 1) + \frac{1}{2n}} \right]$$

Where p is the estimated proportion;
t is the normal deviate from a specified alpha level;
f = n/N;
q = (1 - p); and
n is the sample size.

$$N\bar{y}st \pm tNs(\bar{y}st)$$

Where $\bar{y}st$ is replaced by p; and
s is the standard deviation of the distribution of scores ($s = \sqrt{pq}$).

Table 3

SAMPLE SIZE FOR LESA STUDY*

	TOTAL		BY STRATA		
GRADE	n	AA	NA	MA	O
K	738	99	145	477	17
1	1,042	147	209	662	24
2	788	118	158	490	22
3	634	101	133	385	15
Total	3,202				

*These sample sizes by grade level should permit the estimated number of LESA students per grade level to be accurate within plus or minus 200 LESA students with a 90% probability.

Table 4

ESTIMATED NUMBER OF LESA STUDENTS IN K-3

Grade	Enrollment October, 1976	% LESA By Item and Ethnic Group		Estimated Number of LESA Students
	4,284	9.1%	MA born outside the U. S.	390
	4,499	0.9%	AA born outside the U. S.	40
K	6,554	0.8%	NA born outside the U. S.	52
	154	41.2%	OA born outside the U. S.	63
	15,491	3.5%	kindergarten born outside of the U. S.	545
	4,284	14.9%	MA who do not understand teacher in the classroom	638
	4,499	0.9%	AA who do not understand teacher in the classroom	40
K	6,554	1.6%	NA who do not understand teacher in the classroom	105
	154	35.3%	OA who do not understand teacher in the classroom	54
	15,491	5.4%	kindergarten who do not understand teacher in the classroom	837
	4,284	38.4%	MA who comes from a home in which a language other than English is usually spoken	1,645
K	4,499	0.0%	AA who comes from a home in which a language other than English is usually spoken	0
	6,554	0.8%	NA who comes from a home in which a language other than English is usually spoken	52
	154	76.5%	OA who comes from a home in which a language other than English is usually spoken	118
	15,491	11.7%	kindergarten who comes from a home in which a language other than English is usually spoken	1,815

Table 5

ESTIMATED NUMBER OF LESA STUDENTS IN K-3

Grade	Enrollment October, 1976	% LESA By Item and Ethnic Group		Estimated Number of LESA Students
	5,088	9.9%	MA born outside the U. S.	504
	5,697	0%	AA born outside the U. S.	0
1	8,111	1%	NA born outside the U. S.	81
	186	11.8%	OA born outside the U. S.	22
	19,082	3.18%	first grade born outside of the U. S.	607
	5,088	8.1%	MA who do not understand teacher in the classroom	412
	5,697	0%	AA who do not understand teacher in the classroom	0
1	8,111	1%	NA who do not understand teacher in the classroom	81
	186	0%	OA who do not understand teacher in the classroom	0
	19,082	2.6%	first grade who do not understand teacher in the classroom	493
	5,088	33.2%	MA who comes from a home in which a language other than English is usually spoken	1,689
1	5,697	0%	AA who comes from a home in which a language other than English is usually spoken	0
	8,111	0%	NA who comes from a home in which a language other than English is usually spoken	0
	186	0%	OA who comes from a home in which a language other than English is usually spoken	0
	19,082	8.9%	first grade who comes from a home in which other than English is usually spoken	1,689

Table 6

ESTIMATED NUMBER OF LESA STUDENTS IN K-3

Grade	Enrollment October, 1976	% LESA By Item and Ethnic Group		Estimated Number of LESA Students
	4,366	13.6%	MA born outside the U. S.	594
	5,320	1,2%	AA born outside the U. S.	64
2	7,094	0%	NA born outside the U. S.	0
	198	0%	OA born outside the U. S.	0
	16,978	3.9%	second grade born outside of the U. S.	658
	4,366	9.8%	MA who do not understand teacher in the classroom	428
	5,320	0%	AA who do not udnerstand teacher in the classroom	0
2	7,094	0%	NA who do not understand teacher in the classroom	0
	198	0%	OA who do not understand teacher in the classroom	0
	16,978	2.5%	second grade who do not understand teacher in the classroom	428
	4,366	39.9%	MA who comes from a home in which a language other than English is usually spoken	1,742
2	5320	1.2%	AA who comes from a home in which a language other than English is usually spoken	64
	7,094	0%	NA who comes from a home in which a language other than English is usually spoken	0
	198	0%	OA who comes from a home in which a language other than English is usually spoken	0
	16,978	10.6%	second grade who comes from a home in which a language other than English is usually spoken	1,806

Table 7

ESTIMATED NUMBER OF LESA STUDENTS IN K-3

Grade	Enrollment October, 1976	% LESA By Item and Ethnic Group		Estimated Number of LESA Students
	3,863	15.7%	MA born outside the U. S.	606
	5,121	2.3%	AA born outside the U. S.	118
3	6,733	2.1%	NA born outside the U. S.	141
	157	0%	OA born outside the U. S.	0
	15,874	5.4%	third grade born outside of the U. S.	865
	3,863	5.4%	MA who do not understand teacher in the classroom	209
	5,121	0%	AA who do not understand teacher in the classroom	0
3	6,733	0%	NA who do not understand teacher in the classroom	0
	157	0%	OA whodo not understand teacher in the classroom	0
	15,874	1.3%	third grade who do not understand teacher in the classroom	209
	3,863	36%	MA who do comes from a home in which a language other than English is usually spoken	1,391
3	5,121	2.3%	AA who comes from a home in which a language other than English is usually spoken	118
	6,733	0%	NA who comes from a home in which a language other than Engish is usually spoken	0
	157	0%	OA who comes from a home in which a language other than English is usually spoken	0
	15,874	9.5%	third grade who comes from a home in which a language other than English is usually spoken	1,509

TABLE 8

PARENTAL RESPONSE TO SELECTED ITEMS ON LANGUAGE QUESTIONNAIRE

KINDERGARTEN

QUESTION	TOTAL**	ETHNIC GROUPS* AND RESPONSE			
		MA	AA	NA	OA
		(N = 429)	(N = 113)	(N = 127)	(N = 17)
Was . . . born in the United States?	96.5% yes 3.5% no	90.9% yes 9.1% no	99.1% yes 0.9% no	99.2% yes 0.8 % no	58.8% yes 41.2% no
What language do the people in this household usually speak here at home?	88.8% English 11.7% Other	61.6% English 37.7% Spanish .7% Other	100% English 0% Spanish 0.0% Spanish	99.2% English 0.8% Spanish 0.0% Other	23.5% English 11.8% Spanish 64.7% Other
Please tell me how much . . . understand (his/her) teacher when the teacher is speaking English.	94.6% Understand teacher in English 5.4% Do not understand teacher in English	4.7% (a) Understand little or no English	0.9% (a)	0% (a)	5.9% (a)
		10.1% (b) Understand some English but not enough to understand his teacher in the classroom	0.0% (b)	1.6% (b)	29.4% (b)
		18.6% (c) Understands English but not as much as native English-seaking students	0.9% (c)	2.4% (c)	35.3% (c)
		66.5% (d) Understands English as much as native English speaking students	98.2% (d)	96% (d)	29.4% (d)

*MA, AA, NA and OA are the abbreviations for Mexican-American, Anglo-American, Negro-American and Other-American respectively.

**The totals are a weighted combination of the proportion of LESA students in each ethnic group weighted to produce the population estimated as required by the sample design used by the following formula:

$$pst = \frac{Nhph}{N}$$ (see page 106 of Cochran, 1963).

TABLE 9

PARENTAL RESPONSE TO SELECTED ITEMS ON LANGUAGE QUESTIONNAIRE

FIRST GRADE

QUESTION	TOTAL**	ETHNIC GROUPS* AND RESPONSE			
		MA	AA	NA	OA
		(N = 262)	(N = 59)	(N = 98)	(N = 17)
Was . . . born in the United States?	96.82% yes 3.18% no	90.1% yes 9.9% no	100% yes 0% no	99% yes 1% no	88.2% yes 11.8% no
What language do the people in this household usually speak here at home?	91.1% English 8.9% Other	66.8% English 33.2% Spanish 0% Other	100% English 0% Spanish 0% Other	100% English 0% Spanish 0% Other	100% English 0% Spanish 0% Other
Please tell he how much . . . understands (his/her) teacher when the teacher is speaking English	97.4% Understand teacher in English	1.2% (a) Understand little or no English	0% (a)	0% (a)	0% (a)
	2.6% Do not understand teacher in English	6.9% (b) Understand some English but not enough to understand his teacher in the classroom	0% (b)	1% (b)	0% (b)
		15.8% (c) Understand English but not as much as native English-speaking students	1.7% (c)	5.2% (c)	5.9% (c)
		76.1% (d) Understand English as native English-speaking students	98.3% (d)	93.8% (d)	94.1% (d)

*MA, AA, NA, and OA are the abbreviations for Mexican-American, Anglo-American, Negro-American, and Other-American respectively.

**The totals are a weighted combination of the proportion of LESA students in each ethnic group weighted to produce the population estimate as required by the sample design used by the following formula:

$$pst = \frac{Nhph}{N}$$ (see page 106 of Cochran, 1963).

TABLE 19

PARENTAL RESPONSE TO SELECTED ITEMS ON LANGUAGE QUESTIONNAIRE

SECOND GRADE

QUESTION	TOTAL**	ETHNIC GROUP* AND RESPONSE			
		MA	AA	NA	OA
		(N = 280)	(N = 81)	(N = 93)	(N = 4)
Was . . . born in the United States?	96.1% yes 3.9% no	86.4% yes 13.6% no	98.8% yes 1.2% no	100% yes 0% no	100% yes 0% no
What language do the people in this household usually speak here at home?	10.6% English 89.4% Other	60.1% English 39.9% Spanish 0% Other	98.8% English 1.2% Spanish 0% Other	100% English 0% Spanish 0% Other	100% English 0% Spanish 0% Other
Please tell me how much . . . understands (his/her) teacher when the teacher is speaking English	97.5% Understand teacher in English	2.9% (a) Understand little or no English	0% (a)	0% (a)	0% (a)
	2.5% Do not understand teacher in English	6.9% (b) Understand some English but not enough to understand his teacher in the classroom	0% (b)	0% (b)	0% (b)
		20.2% (c) Understand English but not as much as native English-speaking students	0% (c)	2.2% (c)	0% (c)
		70.0% (d) Understand English as much as native English-speaking students	100% (d)	97.8% (d)	100% (d)

*MA, AA, NA AND OA are the abbreviations for Mexican-American, Anglo-American, Negro-American and Other-American respectively.

**The totals are a weighted combination of the proportion of LESA students in each ethnic group weighted to produce the population estimate as required by the sample design used by the following formula:

$$pst = \frac{Nhph}{N}$$ (see page 106 of Cochran, 1963).

TABLE 11

PARENTAL RESPONSE TO SELECTED ITEMS ON LANGUAGE QUESTIONNAIRE

THIRD GRADE

QUESTION	TOTAL**	ETHNIC GROUP* AND RESPONSE			
		MA	AA	NA	OA
		(N = 223)	(N = 44)	(N = 47)	(N = 4)
Was . . . born in the United States?	94.6% yes 5.4% no	84.3% yes 15.7% no	97.7% yes 2.3% no	97.9% yes 2.1% no	100% yes 0% no
What language do the people in this household usually speak here at home?	90.5% English 9.5% Other	64% English 36% Spanish 0% Other	97.7% English 0% Spanish 2.3% Other	100% English 0% Spanish 0% Other	100% English 0% Spanish 0% Other
Please tell he how much . . . understands (his/her) teacher when the teacher is speaking English.	98.7% Understand teacher in English	.9% (a) Understand little or no English	0% (a)	0% (a)	0% (a)
	1.3% Do not understand teacher in English	4.5% (b) Understand some English but not enough to understand his teacher in the classroom	0% (b)	0% (b)	0% (b)
		12.7% (c) Understand English but not as much as native English-speaking students	0% (c)	4.3% (c)	0% (c)
		82.4% (d) Understand English as much as native English-speaking students	100% (d)	95.7% (d)	100% (d)

*MA, AA, NA and OA are the abbreviations for Mexican-American, Anglo-American, Negro-American and Other-American respectively.

**The totals are a weighted combination fot he proportion of LESA students in each ethnic group weighted to produce the population estimate as required by the sample design used by the following formula:

$$pst = \frac{Nhph}{N}$$ (see page 106 of Cochran, 1963).

TABLE 12

CONFIDENCE LIMITS FOR PROPORTIONS AND

ESTIMATED NUMBER OF STUDENTS BORN OUTSIDE THE UNITED STATES*

GRADE	PROPORTION	LIMITS	ESTIMATED NUMBER OF STUDENTS	LIMITS
K	.0352	.02269 -- .04783	545	380 -- 712
1	.0318	.01618 -- .04741	607	431 -- 782
2	.0388	.02224 -- .05523	658	448 -- 867
3	.0545	.03111 -- .07796	865	541 -- 1190

*The confidence limits are calculated for a 90% probability.

TABLE 13

CONFIDENCE LIMITS FOR PROPORTIONS AND
ESTIMATED NUMBER OF STUDENTS WHO COME FROM
A HOME IN WHICH ENGLISH IS NOT THE DOMINANT LANGUAGE*

GRADE	PROPORTION	LIMITS	ESTIMATED NUMBER OF STUDENTS	LIMITS
K	.1172	.09616 -- .13821	1815	852 -- 2779
1	.0885	.06442 -- .11263	1689	897 -- 2481
2	.1064	.08109 -- .13164	1806	887 -- 2725
3	.0950	.06553 -- .12452	1508	779 -- 2238

*The confidence limits are calculated for 90% probability.

TABLE 14

CONFIDENCE LIMITS FOR PROPORTIONS AND
ESTIMATED NUMBER OF STUDENTS RATED AS
HAVING DIFFICULTY IN UNDERSTANDING INSTRUCTION IN ENGLISH*

GRADE	PROPORTION	LIMITS	ESTIMATED NUMBER OF STUDENTS	LIMITS
K	.0532	.03820 -- .06827	825	519 -- 1130
1	.0259	.01155 -- .04015	493	364 -- 622
2	.0252	.01147 -- .03894	428	317 -- 539
3	.0131	.00010 -- .02618	209	169 -- 248

*The confidence limits are calculated for a 90% probability.

TABLE 15

ESTIMATED NUMBER OF STUDENTS
WHO MEET ANY LESA CRITERIA*

GRADE	PROPORTION	LIMITS	ESTIMATED NUMBER OF STUDENTS	LIMITS
K	.1350	.11276 -- .15729	2092	912 -- 3271
1	.1022	.07660 -- .12775	1950	975 -- 2924
2	.1143	.08827 -- .14032	1941	922 -- 2959
3	.1125	.08087 -- .14403	1785	855 -- 2716

*The confidence limits are calculated for a 90% probability.

TABLE 16

PROPORTIONS AND NUMBERS OF LESA STUDENTS IN K THROUGH 3*

ETHNIC GROUP	GRADE	ph	Nh	N
MA	K	.403	4284	1726
	1	.347	5088	1766
	2	.414	4366	1808
	3	.395	3863	1526
AA	K	.018	4499	81
	1	.000	5697	0
	2	.025	5320	133
	3	.023	5121	118
NA	K	.024	6554	157
	1	.020	8111	162
	2	.000	7094	0
	3	.021	6733	141
OA	K	.824	154	127
	1	.118	186	22
	2	.000	198	0
	3	.000	157	0
TOTAL	K	.135	15491	2091
	1	.102	19082	1950
	2	.114	16978	1941
	3	.112	15874	1785

*A LESA student here refers to one who meets any of the following three criteria: born outside the U.S.; comes from a home in which English is not the dominant language; or whose parents stated that the student had difficulty in understanding his teacher in English.

TABLE 17

ACTUAL SAMPLE SIZES OBTAINED FOR LESA STUDY*

GRADE	TOTAL n	BY STRATA		
		AA	NA	MA	O
K	686	113	127	429	17
1	436	59	98	262	17
2	458	81	93	280	4
3	318	44	47	223	4
TOTAL	1898				

*These are the number of parents contacted by telephone or through the mail. More protocols were returned but this was the only data available by June 1, 1977.

APPENDIX

Conceptualization of an ENP Model

The conceptualization of an Educational Needs Projection (ENP) model involves the consideration of what purposes (questions) the model or models are designed to address, what information would be needed to address such questions, the procedures for obtaining such information in a usable form, and the procedures for analyzing the information.

The initial ENP model addresses the general question of "How many teachers will be needed for bilingual education programs in HISD?" [1] The initial ENP model for forecasting teacher personnel needs involves determining the number of students to be served by the category of teacher (e.g., the number of Limited-English-Speaking-Ability (LESA) students) and the student/teacher ratio (see Figure 1). By multiplying the number of students to be served by the student/teacher ratio, the number of teachers needed is estimated. The number of teachers certified to teach in the area (e.g., bilingual education) subtracted from the overall number needed leaves the number of additional teachers needed.

There are a number of procedures for determining the basic model parameters. The determination of the number of students to be served, the number of certified and/or qualified teachers available, and the student/teacher ratio is not as simple as it might appear. The determination of the number of students to be served may depend on the legal definition of the type of student (e.g., limited-English-speaking-ability students (LESA) to be served; may involve a count of every student enrolled in the district (e.g., survey of LESA students for the Texas Education Agency); may require special testing procedures (e.g., Lau vs Nichols); may require the construction, development and validation of student identification procedures (e.g., Task Force Findings Specifying Remedies Available for Eliminating Past Education Practices Ruled Unlawful under Lau vs. Nichols); may involve enrollment prediction models (see Johnstone, 1974; Gattis and Dunklau, 1975); and may involve the development of sampling procedures with appropriate formulas for estimating the number of students to be served. The determination of the number of certified and/or qualified teachers already working for the district or available for employment, may involve similar procedures, and the determination of the student/teacher ratio involves the consideration of the number of certified teachers who are actually used in the classroom rather than in some other capacity. These procedures, however, do not constitute the model for estimating teacher personnel needs. Other components are involved.

One component involves obtaining information on current and expected legislation, court decisions, and regulations, and noting how such information may affect the model. Another component involves estimating changes in the student population due to migration in and out of the district. And a third component involves estimating the available supply of teaching personnel with appropriate certification and/or qualifications. Each component involves factors which affect the basic model parameters (i.e., the number of students to be served, the student/teacher ratio, and the number of teachers who are certified and/or qualified to teach in the program).

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[1] This question is actually too general, but it may serve to explain the model.

Current and expected legislation, court decisions and regulations may affect all three basic model parameters, but especially the first two parameters. Procedures are needed here for monitoring current and expected legislation, court decisions and regulations, and for predicting future legislation, court decisions and regulations. The procedures used in HISD to monitor and to some extent predict legislation, court decisions and regulations are described in a report entitled "Current HISD Procedures for Monitoring Educational Legislation" by Urbina and Alston. In reference to bilingual education, a report entitled "Review of Legislation and Court Decisions Affecting Bilingual Education" has been prepared by Ms. Flores. Procedures for predicting educational legislation are plannned for 1977-78. These procedures will involve the identification and survey of those groups who are most influential in determining public school legislation and policy (see Objectives I and II of the 1977-78 ENP Model proposal). Given the information on current and expected legislation, and court decisions and regulations, the effects on the basic model parameters may be calculated.

Another component involves estimating changes in the number of students to be served by migration in and out of the school district. Consideration of procedures to be used in estimating migration in and out of this school district is in the preliminary stage. A computer search on the topic has been made and some sources of information have been collected. In the short run, the use of other institutions' studies and locally conducted studies of changes in enrollment may be useful (c.f., Smedley and Meier, 1976; Olson, Meier and Webster, 1976). In the long run, the development of more sophisticated models Ventura and Wilson, 1976).

A third component involves estimating the available supply of teaching personnel with appropriate certification and/or qualifications. This component is also in the initial stage of development. Several questions may be considered here: "How many teachers with appropriate certification are currently employed?"; "How many of these teachers are qualified to conduct instruction without extensive staff development?"; "What educational institutions are these teachers from?"; "How many certified teachers will be graduated and available for employment in the next few years?"; and "What is the trend in teacher turnover rates by teacher category?" To address these questions, surveys may be conducted, historical data on teacher turnover rates may be calculated and used in forecasting models (e.g., Davis and Dunklau, 1976) and the results of other studies may be used (e.g., Study of Bilingual Education Programs in Institutions of Higher Education by National Center for Educational Statistics; Teacher Eucation Programs for Bilingual Education in U. S. Colleges and Universities: 1975-76 by Dissemination and Assessment Center for Bilingual Education). A preliminary report on "Sources and Availability of HISD Personnel for Bilingual Education Programs" is being prepared.

Figure 1

Initial ENP Model(s)

"a"		"b"		"c"
No. of students in category to be served	X	Student/Teacher Ratio	=	No. of teachers for program

"c"		"d"		"e"
No. of teachers for program	-	No. of HISD teachers with appropriate skills	=	No. of additional teachers needed

Procedures that may be used to estimate the basic model parameters ("a", "b", and "d") include the following:

Computer search for references
Review of references
Legal staff reports
Local surveys
Questionnaire construction
Sampling plans with population estimation procedures
Enrollment prediction models

Component: Monitoring and Predicting Legislation, Court Decisions and Regulations

HISD Legislative Task Force
Computer search for references
Review of references
Legal staff reports
Texas Legislative Services
Reports from Legislators
Reports from members of educational organizations
Identification and surveying of educational policy making groups

Component: Student Migration

Computer search for references
Review of references
Use of studies already conducted
Enrollment prediction models

Component: Supply of Teachers

Computer search for references
Review of references
Use of studies already conducted
Faculty projection models

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